Draft
Minutes
ASC OP1 ASC OP/SC 1, Appearance Imperfections Task Force Draft Standard Meeting
Sunday, July 31, 2005, 1:00 p.m. — 6:00 p.m.
San Diego Marriott Hotel and Marina, Los Angeles Room
333 West Harbor Drive, San Diego, CA, 92101

Attending	Committee Members (6/)	Representing
☒	David Aikens	Zygo Corporation
☐	Sam Bailey	Davidson Optronics, Inc.
☒	Gordon Boultbee	JDS Uniphase Corporation
☐	Andrei Brunfeld	Xyratex
☐	Bryan Clark	Xyratex
☐	Walter Czajkowski	Edmund Industrial Optics
☒	Frank Dombrowski (by phone)	Gage-Line Technologies
☐	Marla Dowell	IEEE/LEOS (NIST)
☒	Lincoln Endelman	SPIE, (Endelman Enterprises)
☒	Charles Gaugh	Davidson Optronics
☒	John Hamilton	Northrop Grumman
☐	Rudolf Hartmann	Retired
☐	Hal Johnson	Harold Johnson Optical Lab
☒	William Royall (by phone)	Eastman Kodak Company
	Observers	
☒	Gene Kohlenberg	OEOSC

Auditor's Summary of Meeting

At this meeting the committee settled on a working scope for the optical imperfection performance standard: "Provide the optical community with a notation for localized phase artifacts and their impact on optical systems and components." They also agreed upon the following action items:

- The Chairperson directed the Secretary to ask J. Hamilton to submit his notes concerning the gage study to the committee so that the committee could complete the gage report.
- The Chairperson asked C. Gaugh to develop a new work proposal, independent of Northrop's, that describes what scratch and dig samples would be circulated to which companies, and how the evaluations by those companies should be reported back to the committee.
- C. Gaugh said that he would ask companies that he knows who have the problem of noting performance limits for optical surface imperfections on drawings. He could ask them to e-mail him the boiler plate off of their drawings.
- The committee will solicit input from OP members for any language that that they use on drawings to specify coherent artifacts.
- The committee will create a MIL-C-48497 ("Military Specification Coating, Single or Multilayer, Interference: Durability Requirements for") like notation proposal to streamline the use of ISO 10110-7 notation.
- G. Boultbee will look at a replacement for ISO 10110-7 method I notation or create a third notation.
- Committee members will comment by e-mail about their general impressions of the incorporation of MIL-C-48497 ("Military Specification Coating, Single or Multilayer, Interference: Durability Requirements for") and MIL-F-48616 ["Military Specification Filter (Coatings), Infrared Interference: General Specification for "] type of notation into ISO 10110-7 before the January meeting.

Welcome and Introductions

D. Aikens opened the meeting at 1:07 p.m. There was no need for introductions.

Adoption of Agenda

L. Endelman moved that the draft agenda be adopted. G. Boultbee seconded the motion. The motion carried unanimously.

Approval of the Sunday, January 23, 2005 ASC OP/SC 1, BSR/OEOSC-OP1.002, Optics and Electro-Optical Instruments – Optical Elements and Assemblies — Appearance Imperfections Draft Review Minutes

At the last meeting the secretary noted that he needed assistance in completing the section concerning ISO 14997:2003. G. Boultbee supplied the information. G. Boultbee moved that the minutes be approved as edited and L. Endelman seconded the motion. The motion carried unanimously.

Approval of the Sunday, May 1, 2005 ASC OP/SC 1, BSR/OEOSC-OP1.002, Optics and Electro-Optical Instruments – Optical Elements and Assemblies — Appearance Imperfections Draft Review Minutes

The minutes had been distributed by e-mail. The Chairperson asked if there were any additions or corrections to the minutes. G. Boultbee moved that the minutes be approved and W. Royall seconded the motion. The motion carried unanimously.

Status of BSR/OEOSC-OP1.002

G. Kohlenberg reported that the ballot had been distributed July 12, 2005 with a closing date of August 10, 2005. To date three ballots had been returned. The secretary stated that after the balloting period is closed, assuming that the standard is approved, he will then work with ANSI to determine if he needs to start over with the BSR-8 submission that would start a new sixty day national review of the standard.

L. Endelman asked if we were going to submit this standard as an ISO draft. D. Aikens stated that in its present form it could not be an ISO standard. John Rogers (who was the leader of the ISO working group) decided that the metrology portions should not be part of the specification document. L. Endelman asked if it could not be submitted outside of the ISO 10110 document family. W. Royall said that he thought that the only way to add such a standard is to make an improvement to an existing part of the ISO 10110 standard. D. Aikens said that we need to convince ISO/TC 172/SC 1/WG 2 that an appearance specification should be allowed in addition to the measurement specification identified in ISO 10110-7, which already includes a method developed by DIN and a second developed by AFNOR. He said that he has discovered by talking to others at ISO meetings that ISO 10110 is not universally used outside of Europe. There are several European companies that still use the US military specification rather than ISO 10110, especially in Britain and some smaller countries in the western block. Japan still uses the military specification, although they are becoming more familiar with ISO 10110. The French still tend to use their standard. If we were to ask others about using an appearance standard, we would probably only be supported by Japan, India and perhaps some smaller western block countries. G. Boultbee suggested that we should urge countries who are still using MIL-PRF-13830 to support OP1.002 so that it would be a viable alternative to ISO 10110.

W. Royall suggested that we should prepare a proposal to include an appearance section in 10110 for the Boulder meeting in 2006. D. Aikens stated that he thought the metrology and specifications sections would have to be separated. L. Endelman suggested that both working groups be shown the draft and ask them if the two WGs want to develop it as two standards or whether they want it released as a unified standard.

D. Aikens proposed tabling this discussion until the ASC OP meeting on August 1, 2005. The committee agreed.

Report of Gage Study

The secretary reported that J. Hamilton has been tied up with Northrop Grumman tasks, and hasn't been able to complete the report for the gage study. C. Gaugh said that Davidson Optronics wants to have its artifacts considered in a round robin evaluation. D. Aikens said that until J. Hamilton is able to get back to the study there is little that the committee can do unless someone else would be willing to manage a round robin evaluation series. D. Aikens said that H. Pollicove wanted to get universities and colleges, such as Monroe Community College in Rochester, NY and the University of Arizona, involved. D. Aikens suggested that C. Gaugh develop a new work proposal, independent of Northrop's, that describes what samples would be circulated to which companies, and how the evaluations by those companies should be reported back to the committee. The proposal could be reviewed by W. Royall at Kodak and D. Bronstrop of Brysen Optical Corporation before presenting it to the whole committee. C. Gaugh said that he would like to see the round robin be a double blind test. D. Aikens asked the secretary to ask J. Hamilton to submit his notes to the committee so that the committee could complete the gage report. This will be an agenda item at the San Jose meeting in January.

Scope of Imperfection Performance Standard

The Chairperson asked the secretary what white papers had been received concerning the performance standard. The secretary said that he had received one from R. Hartmann and had pulled in the article written by L. Baker. Both of these were placed in the ASC OP1 section of the OEOSC web site. D. Aikens said that he had his Zygo white paper with him.

1. The international standard for amplitude imperfections is inadequate today because of lack of correlation between chrome defects and non-chrome defects. Zygo would like to see changes to incorporate a more appropriate comparison method.
2. The performance based standard needs a metric for phase artifacts. The optics community needs a way to specify the impact of phase on a coherent optical system. Zygo cares about impact on the phase not on amplitude. There is no good modeling tool to determine the affect of the phase artifacts on performance.
3. The standard must include a method of evaluation and a method for modeling the artifact in coherent systems.

The Chairperson asked about the other white papers. The secretary said that he had uploaded R. Hartmann's paper titled, "Performance-based Optical Surface Imperfection Standard." that was presented at an earlier meeting. It uses a scattering approach.

G. Boultbee said that JDS Uniphase is considering trying to do ISO 10110-7 test method II. They will also consider R. Hartmann's method.

G. Boultbee brought iron oxide artifact samples with him to the meeting that were used at JDS Uniphase for a particular project. They needed to perform a microscope inspection of a 20 µ potential imperfection. The artifact was a 20 µ circle which could be placed over the unknown imperfection since the artifact plate is transparent. They got 90% correlation with the customer's $100K test device. He said that the advantage is that the samples are transparent so that the viewer can interpolate between artifact numbers more easily.

At the $100 K cost level there are other techniques for characterizing imperfections. There are five types of scanning white light interferometers on the market. These can measure in three dimensions down to the 0.5 µ. There is no notation for characterizing these artifacts.

Scatter-based technologies don't give you a map; an objective measurement tool would give you the map.

D. Aikens noted that the iron oxide approach is a potential improvement to chrome on glass.

Functional testing will be different for each application, so that technique is off the table for a general standard. Functional testing is becoming the norm for electronic products. The other approach is to test the change in performance as a function of its parameters.

C. Gaugh noted that it is often possible to sort parts by doing performance testing and still get components that fail in the product.

D. Aikens said that optics needs an equivalent of the electrical world's "bed of nails" test system.

W. Royall noted that Kodak had a problem with a laser scanning system when lint obstructed the beam and caused streaking in the image. They ultimately specked the unit by stating the size and length of the lint allowed.

D. Aikens noted that it is probably easier to measure scatter and infer what is attenuated than to determine how the image is attenuated.

The performance standard for coherent systems in terms of phase artifacts is unexplored territory today. There is no standard that addresses phase imperfections. It seems that performance standards for phase systems are not addressed by ISO. That is something this committee could address. Amplitude performance based standards may best be addressed by ISO 10110-7 method II. JDS Uniphase approached the French concerning their device. It is not for sale and the technique is proprietary.

G. Boultbee noted that he had supplied a document describing imperfection testing for paint surfaces. The document is on the OEOSC website.

D. Aikens said that the automotive industry is using scanning white light interferometry to evaluate bearings, valve seats, etc. One company has sixty of these units. Zygo would be willing do some work in this area.

Plan an Objective Scratch Measurement Method

Scratch evaluation is the major problem If that problem is solved, then the dig problem is easily solved. G. Boultbee noted that digs are already objectively specified even though they are evaluated subjectively. D. Aikens felt that the current subjective dig evaluation is adequate. The performance of an instrument is affected by the morphology of the scratch, not just its width.

The committee recessed 2:58 p.m. and reconvened at 3:18 p.m.

The Chairperson began the next part of the meeting by summarizing possibilities for amplitude and phase standards. A performance based standard for amplitude defects could be a straight forward adoption of ISO 10110-7 method II or a variation of such. A performance based standard for phase defects is unimaginable at the present time. That subject should be a topic for a future meeting. This committee could make a contribution in the area of standards for amplitude imperfections. The committee could develop a language that fixes ISO 10110-7 method I, which either changes the current notation or creates a new notation that gets rid of the square root problem. The committee could also offer changes to ISO 14997 ("Test methods for surface imperfections of optical elements "). The Chairperson could imagine a notation that is more closely aligned with MIL-O-13830 but with a specific scratch width. The military tried to do it in 1974 and failed. The committee should look at MIL-C-48497 and MIL-F-48616. The committee would address length and width, but not depth.

D. Aikens asked that those attending voice their opinion about what the committee does next.

L. Endelman said that the next task should be the easiest one to do.

W. Royall agreed that the committee needs to do something in the functional performance arena.

C. Gaugh agreed with L. Endelman; the committee needs to focus on what's achievable and easily achievable. The committee should look at ISO 10110-7 method I. If it could come up with a framework and a notation for phase artifact which might lead to some methods of measurement. It needs to develop nomenclature.

G. Boultbee agreed with the idea of a simplified nomenclature for scratches. Could the committee then come up with better ways of measuring? He is not sure that it can. He likes the idea of developing a notation, but if we don't know what to do with it, it may be a wasted effort. C. Gaugh said that having a clear notation is useful for the industry. How it is used is still negotiable between the manufacturer and the client. Metrology tools would follow the development of the notation. D. Aikens noted that the automotive industry came up with a notation for the parameter for bearing roughness. Then scanning white light metrology tools came along a decade after the notation was developed.

If the committee were to create a sketch of the notation, it could be shown to the metrology companies in the hope that they could develop the tools.

At this point the Chairperson suggested that the committee has narrowed the field of development to a standard that describes phase artifacts in coherent systems, and a proposed language for ISO 10110-7 that would lead to a more usable version of that standard.

L. Endelman suggested the following scope for the new performance standard: Provide the optical community with a notation for localized phase artifacts and their impact on optical systems and components. The Chairperson agreed that this statement is a good working scope for the committee.

D. Aikens asked for a volunteer to create the first draft of the notation proposal. G. Boultbee said that JDS has a laser production group who he could ask whether such a notation would be useful. C. Gaugh said that he would ask companies that he knows who have this problem. He could ask them to e-mail him the boiler plate off of their drawings.

G. Boultbee said that this notation would be a “short hand” to simplify documenting what needs to be described on the drawing.

The Chairperson asked that the committee solicit OP members for any language that specifies coherent artifacts. He also asked that Micahel Bray and experts from Schott, Hoya, Ohara and Corning be added to the distribution list of the letter requesting current notations used on drawings that address the phase artifact specification problem.

The Chairperson stated that the second action item is the creation of a MIL-C-48497 like notation proposal to streamline the use of ISO 10110-7 notation. He suggested that the committee could start with the ISO 10110-7 language and develop a US national standard, including OP1.002 as a reference for cosmetic notation. The committee could then add a section describing a performance notation. G. Boultbee said that would be a fine way to start because the military specs have extra sections that are not needed, while ISO 10110 only deals with this subject. L. Endelman said that the original authors of ISO 10110 may object to any changes, using the reasoning that the current form works for them. G. Boultbee suggested that we should not hesitate to continue such a development. If the rest of the ISO committee doesn't want to modify ISO 10110-7 in our proposed manner, then we would simply stop at the point of making it an ANSI standard.

C. Gaugh asked if it is politic to keep the good German and French sections to enhance the probability of a successful eventual international adoption. D. Aikens replied that indeed the good sections should be kept. The committee should not start from scratch.

D. Aikens proposed that G. Boultbee look at a replacement for method I notation or create a third notation. The Chairman asked the the secretary make ISO 10110-7 available to committee. He also asked that committee members comment by e-mail about their general impressions of the incorporation of MIL-C-48497 and MIL-F-48616 type of notation into ISO 10110-7 before the January meeting.

F. Dombrowski joined the meeting by phone. He asked if the committee had been able to look at his samples. D. Aikens said that the committee would like to use his samples in the comparisons that J. Hamilton is conducting. D. Aikens told F. Dombrowski that G. Boultbee had made artifacts out of iron oxide that were transparent. F. Dombrowski said that the chrome could be made less dense. His samples have about 5% reflectivity. C. Gaugh noted that ISO calls for highly reflective chrome. F. Dombrowski said that he would mail artifacts to J. Hamilton. He could make up high reflectance samples, too. W. Royall told F. Dombrowski that he had a set of DIN artifacts that he could show him. D. Aikens asked W. Royall if he had compared the DIN samples with the Kodak paddle. W. Royall said that they could not be easily compared. D. Aikens said that he hoped that the committee could decide at the January meeting if the reference samples should be made with chrome.

Time and Place of next OP 1 Meeting

C. Gaugh proposed that we meet on the first day of the conference, which is Saturday. The meeting will be held on January 21, 2006 in the morning so that a wavefront meeting could be held in the afternoon. C. Gaugh made his suggestion a motion, which G. Boultbee seconded. The motion carried.

Adjourn

L. Endelman moved that the meeting be adjourned; C. Gaugh seconded the motion, which carried unanimously. The meeting adjourned at 5:05 p.m.